**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

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| In the Matter of | ) | |
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| Forward-Looking Mechanism | ) | DOCKET FILE COPY ORIGINAL |
| for High Cost Support for | ) | CC Docket No. 97-160 |
| Non-Rural LECs | ) | |
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**Comments of the**
**Rural Utilities Service**
**on Outside Plant Structure**

The Rural Utilities Service (RUS) appreciates the opportunity to offer comment to the Commission on the issue of outside plant structure in proxy models for non–rural LECs.

The most rural of the rural areas served by the non-rural LECs are similar to the rural areas served by RUS-financed rural LECs. The RUS has almost fifty years of experience with rural outside plant structure, and is sharing this experience to ensure that all rural, high cost customers receive service that is comparable in quality and affordability to that available in urban and suburban areas.

## General

Outside plant is where most of the money is spent to serve rural customers. Whereas switching costs and interoffice transport costs are somewhat higher for rural customers, the big difference in investment per customer and monthly cost-to-serve per customer between rural and urban areas is in the feeder and distribution plant.

In rural areas, distances primarily determine costs. Rural customers live farther from their exchange switches, so feeder lengths are greater. Rural customers live farther from each other, so distribution lengths are greater. A model which underestimates either distance will underestimate the cost of serving rural customers. All other factors are secondary compared to the accurate prediction of these two distances.

In these Comments, the RUS offers comments on the issues raised in the Further Notice of Proposed Rulemaking and comments on issues discussed at the series of public meetings

conducted by the Federal Communications Commission (Commission) on outside plant design.

**General Comments**

"As the crow flies" cable routing is a fatal flaw in any model

Neither the sponsors' models nor the Commission's model specifically links plant construction to roads. Plant is not built "as the crow flies" because it is cost prohibitive. If models are going to persist in placing both feeder and distribution plant along hypothetical routes that do not follow roads, significant additional costs are going to have to be included in plant estimates.

The cost of cross-country rights-of-way will become a major additional cost of plant. Landowners in rural America regard their land as a revenue-earning asset. Whether they farm it, graze it, subdivide it, lease it, or simply hold it, they know that land is money. They have high expectations that any use of their land by another party will return them a substantial return. As a result, as early as the 1970's, RUS knew that private right-of-way, even just inside the fence along roadways, was becoming unaffordable. Public right-of-way remained essentially free-of-charge, although with time states and local governments imposed conditions upon its use. In addition, landowners know that when they allow a rural utility to use their land for cable placement, it is just the beginning. The utility will travel the right-of-way occasionally for maintenance of its plant, and eventually will place more plant along the right-of-way. Many rural landowners, particularly farmers and ranchers, refuse their RUS-financed LECs any access, even though these LECs are member-owned cooperative-type organizations.

A second cost that would need to be added is the cost of clearing and site preparation. Highway rights-of-way are cleared and maintained by highway departments. Utilities using them do not have to bulldoze woods or smooth bluffs to run their cable. When they reach rivers, they can attach to bridges, rather than constructing elaborate aerial crossings such as pipelines must do.

Another cost involved with private right-of-way is the legal cost of negotiating agreements and filing them with appropriate courts. RUS borrower LECs using significant amounts of private right-of-way have had to keep a right-of-way specialist with the plow train during construction because many landowners forget that they have granted right-of-way, or change their minds when they see the aftermath of the construction.

A further complication with proposing that feeder and distribution plant be run "as the crow flies" is that no one, except perhaps the cross-country gas and oil pipeline industry, has cost information for this type of construction. No RUS borrower LEC runs plant in this manner. The most efficient construction projects are the ones that involve a minimum of private right-of-way.

In a recent meeting at the Commission, one model sponsor showed its plant layout for Gunnison, Colorado. This layout showed many cables being routed over the tops of tall mountains. The cost of such construction would be prohibitive. The alternative routing along highways would require many more miles of cable. Modelers need to decide whether they want to include the huge cost of "as the crow flies" plant routing, or whether they are going to true up the mileage to more nearly approximate the public road mileage for the area.

Loop length is a poor indicator of cost

The average loop length in an exchange has little value as an indicator of the average cost of serving customers in that exchange. Examples 1 and 2 illustrate the problem with loop length. Average loop length does not take clustering into consideration. Five customers evenly distributed on a circle with a wire center at its center, where each is at a distance of 10 miles from the central office (thus with an average loop length of 10 miles), would cost about five times as much to serve with outside plant as the same five customers if they were all clustered at a point 10 miles north of the wire center (again, with an average loop length of 10 miles).

The RUS uses route mileage, and the related density per route mile, as accurate indicators of outside plant cost. Congress recognizes this valid indicator of cost and prescribes in the RUS's enabling legislation that certain RUS loans may be made only to applicants with defined route mileage densities.

An understanding of customer clustering is critical to outside plant cost estimating

A model which uses customer clustering assumptions to predict distribution costs is not going to work for rural America. Even at the census block level, rural customer distribution does not assume any pattern such as Hatfield's 85% clustering. After attending sessions in which the three model sponsors (Hatfield, BCPM, and Commission) explained customer prediction, RUS believes that the BCPM has the most reliable method of predicting customer location within a census block. For all but the most rural of areas, customers are located generally within a fixed distance of roads. Roads are a reasonable predictor of customer location, and lot sizes increase as density decreases. The BCPM method needs to be a user-adjustable input for use in the most rural of areas.

Hatfield's 85% clustering factor seems more appropriate for Alaskan villages than for rural areas in the lower 48 states. The RUS has examined exchange maps for several rural areas in the course of preparing these comments, and found no case where clustering occurred at a rate approaching 85%. Clustering occurs, but a different rate everywhere. The Hatfield model may be evolving to recognize actual customer geocoded locations, but as RUS stated in its September 11, 1997, Ex Parte letter, the data base used by Hatfield fails to geocode about two-thirds of rural customers. This means the Hatfield model will

continue to rely on its clustering mechanism to estimate customer distribution within census blocks.

Clustering is crucial to outside plant cost as can be seen from the discussion above concerning loop length. In a model that uses clustering assumptions to define customer distribution, small errors in this clustering assumption will cause large errors, consistently repeated in every census block, in distribution costs.

A proxy model should only apply modern plant elements

In moving from loaded loops to T1 distribution loops, Hatfield has traded a 50-year-old technology for a 25-year-old technology. The Commission's model uses copper-based T1 in some applications and fiber-based carrier in other applications. This may appear the most efficient use of resources but most designers will accept a cost penalty to avoid built-in bottlenecks to system expansion. No RUS-financed projects currently use new T1 carrier in distribution loops. It requires careful and expensive interfacing to maintain modem signal integrity. The T1 facilities on copper cable will not migrate gracefully to provide an *evolving* level of telecommunications.

**Comments on issues raised in the Further Notice of Proposed Rulemaking**

Plant mix

In paragraph 57, it is stated that efficient carriers would vary their plant mix (the ratio of buried to aerial plant) depending upon the terrain in an area, and the likelihood of damage from environmental elements such as hurricanes. Efficient carriers carry a strong preference for buried plant into a construction project, because there are many advantages of buried plant. Very rocky areas generally only require short runs of aerial placement of the buried cable, called "aerial inserts." The RUS agrees that weather conditions are a major factor in a carrier's preference for buried plant, but hurricanes are not the primary weather condition that damages aerial cable. Ice storms damage many miles of aerial cable each year, and normal conditions such as exposure to sunlight and temperature extremes shorten the life of aerial cable. The first states in the RUS program to embrace buried plant statewide were Iowa, South Dakota, Minnesota and North Dakota; these are not states that often see hurricanes or tornadoes. These states have normal soil conditions and harsh winter weather. Nationwide, RUS-financed systems are over 67% buried, and the vast majority of that is plowed cable.

Installation and cable costs

The RUS suggested how to handle the added cost of placing buried plant in rock areas in its Reply Comments of February 24, 1997. These extra difficulty items should be handled by adders, not multipliers such as the 3.5 and 2.0 multipliers used by Hatfield. The added difficulty, and resulting added cost, of installing a 600 pair cable in hard rock is the same

as for a 25 pair cable. A slot must be either blasted, sawn, or trenched in that rock, and the cable is then laid and backfilled. This supports a cost adder, not a multiplier. A multiplier will overestimate the cost of placing large cables in rock and will underestimate the cost of placing small cables in rock. In addition, the Hatfield ratios are unrealistic. The RUS national average cost adders for hard and soft rock placement are $7.97 and $0.37 per foot, respectively.

Paragraph 61 states a technique used by Hatfield to reduce the application of rock adders. Hatfield increases cable length by 20% to reflect a practice of going around rock. This would be a very poor practice, and to RUS' knowledge, no LECs do this. It would greatly increase the difficulty of accurately locating the buried cable as is necessary when the area is to be disturbed, by the LEC, another utility, or the landowner. It would increase the probability that a paralleling facility would either be cut during the construction of the telephone cable, or that the telephone cable would be cut during the installation of future facilities in the area. It also would violate the assigned construction corridors currently used by state highway departments and landowners.

Paragraph 62 states that BCPM does not differentiate between the cost of installing feeder and distribution plant. RUS experience agrees with this. In fact, feeder and distribution cables cannot be distinguished in the RUS outside plant construction contract.

Structure sharing

There are several reasons that structure sharing does not occur in rural areas:

1. The main reason structure sharing is unrealistic in rural areas is that the participating utilities would have to place facilities at the same time. This would occur only when all participating utilities have to build plant because of plant capacity exhaustion, deterioration, or obsolescence. It would not occur unless all utilities had simultaneous access to adequate capital, because the timing of most utility projects is determined by availability of funding. One utility would always be waiting for others to obtain funding, and plans and needs would change many times before all obstacles were cleared and the project actually got underway. Customers and regulators waiting for service improvements would find this situation intolerable.

2. Physical separation of facilities is the best and least expensive way to minimize power line-induced noise in copper telecommunications cables. Adequate random separation cannot be accomplished when both facilities are on the same pole line, or in the same trench. The main reason that rural telecommunications circuits are quieter today than they were thirty years ago is that most are now buried. Induced noises (in the forms of hum and crackling static) are especially troublesome for computer modem communications, and they limit modem operating speeds.

3. Plowing is the most efficient way to place rural telecommunications plant. Trenching is so costly, and unnecessary, that RUS eliminated trenching units from its construction contract in 1980.

4. Most buried rural telecommunications facilities are on highway rights-of-way. Highway departments, in an effort to maintain order on their rights-of-way and simplify things when they have to dig or perform maintenance, often assign utility "corridors" to different utilities. Structure sharing would violate these corridor assignments. The RUS does not know of any jurisdictions which encourage corridor sharing, but does know of states (Texas, for example) where exclusive corridors are assigned.

5. Sharing with CATV cables is not possible in most rural areas because rural areas outside towns are not wired for cable television service. Few RUS-financed facilities parallel CATV facilities.

6. Structure sharing with buried electric facilities would generally require trenching, which is far more costly than plowing in rural areas. Even if a multiple facility cable plow were to become commercially feasible, its use would be substantially more complicated and expensive than current plowing equipment because it would have to meet the handling requirements (such as minimum bend radii and pull tensions) of two dissimilar facilities.

Structure sharing assumptions should not be applied to rural buried plant design.

Digital loop carriers

Small DLCs are not very expensive, which is why rural plant designers use so many. A Michigan independent recently bought a 28 line Siemens DLC for $15,121 and a 119 line Siemens DLC for $39,600. A Wisconsin independent recently bought 180 line DLCs from AFC for $72,635 each. RUS has provided DLC cost information to David Gabel of NRRI for the purpose of establishing a cost algorithm.

Network interface devices

In Reply Comments dated February 24, 1997, RUS stated that the average actual cost of a single line network interface device (NID) placed in a rural area is $58.41. Model sponsors should not be allowed to place oversized facilities in rural areas (such as 6 line NIDs) and credit only a portion of those oversized facilities (such as one line) to the telephone service provider. RUS agrees with the statement in paragraph 114 that the Commission should prescribe costs for various devices, such as NIDs.

**Conclusion**

The proxy models are under such rapid development that RUS cannot get current versions to run and compare to actual costs to serve. We hope to do this by the deadline for filing

reply comments. In these circumstances, RUS and the other commentors can do no more than argue the merits of the sponsor's approaches.

A model that uses "as the crow flies" feeder or distribution plant routing will understate the cost of serving rural America and will result in insufficient support for high cost loops. Wires cannot fly free-of-charge over mountains and rivers, and they cannot sneak through farmers' fields unnoticed and unpaid. Wires must follow roads. Some method of truing to actual road mileages must be incorporated.

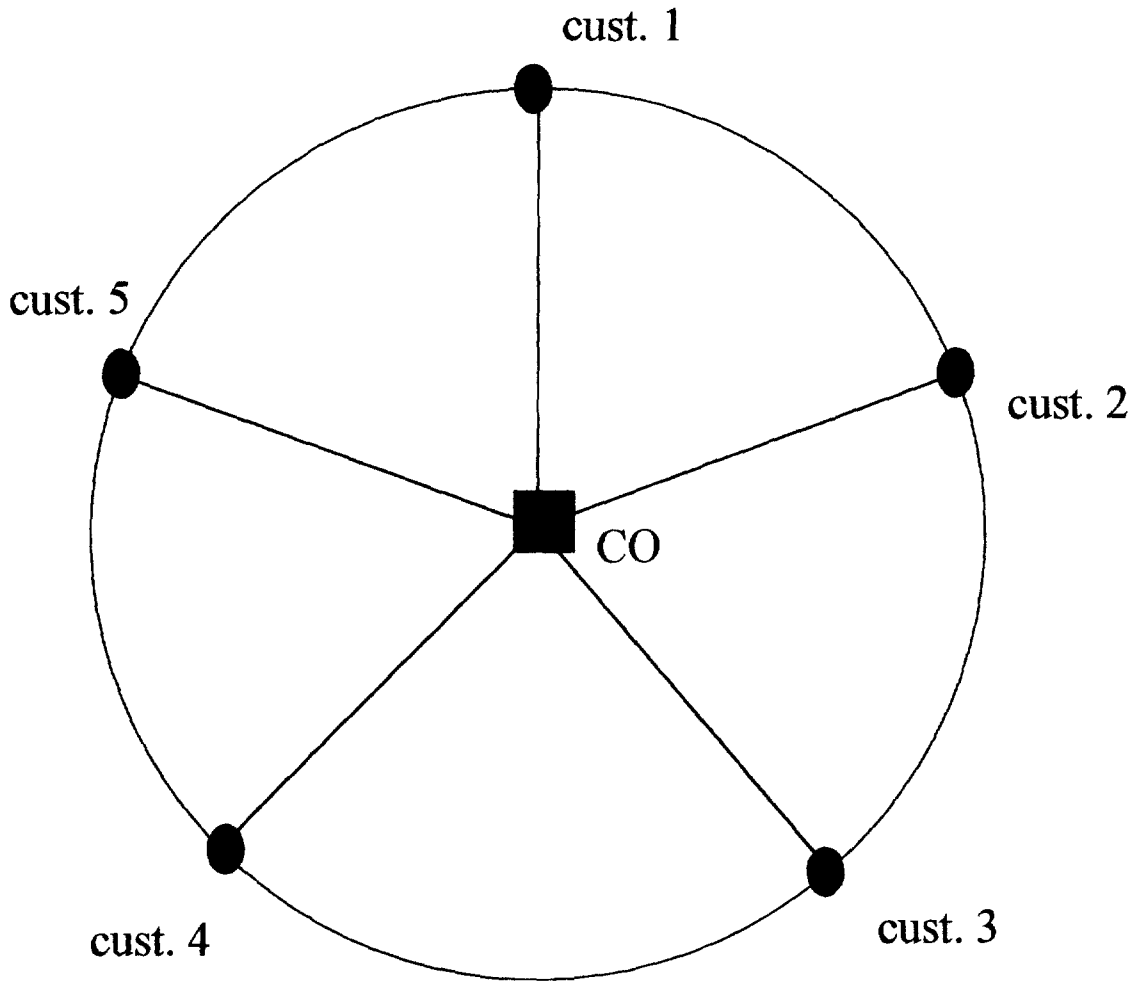
Customer clustering assumptions are the other factor that will doom a proxy model to failure in rural areas.

Structure sharing for buried plant in rural areas will not and should not occur. It can only happen where a series of very unlikely events that are outside the control of the LEC occur concurrently, and then only in states that do not prohibit it.

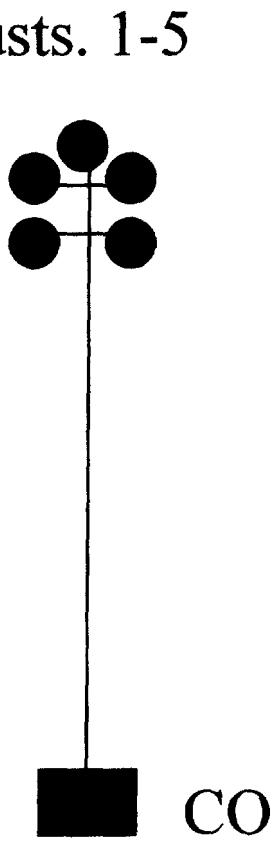
Thank you for the opportunity to comment.

Dated: 9/24/97

Administrator
Rural Utilities Service




Example 1
Average Loop Length = 10 miles
Routes Miles of Plant Needed = 50 miles




Example 2
Average Loop Length = 10 miles
Route Miles of Plant Needed = 10 miles